TOTAL THYROIDECTOMY FOR HEART DISEASE*

A FIVE-YEAR FOLLOW-UP STUDY

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TOTAL THYROIDECTOMY for heart disease was first performed in 1932. This surgical procedure represented an attempt to bring relief to cardiac derelicts by altering the normal physiologic mechanism. The rationale of this procedure has been repeatedly discussed in publications from this clinic and elsewhere.[5, 11, 12, 19] Numerous reports have presented the immediate and early results, the technic of the procedure, and the fundamental changes which are brought about.[1, 4, 8, 9, 10, 13, 20, 21, 22, 23, 24, 25] Sufficient time has now elapsed since total thyroidectomy for heart disease was first performed for a more considered opinion than has heretofore been available. In this report we are including every patient submitted to total thyroidectomy for heart disease in the Peter Bent Brigham Hospital during 1932, 1933, and 1934. Either the present status or cause of death has been ascertained.

The cases in our study total 57, and have been divided into two fundamental groups: Those (32 patients) with intractable angina pectoris; and those (25 patients) with some form of congestive heart failure which did not yield to the usual conservative measures. Sixteen patients survived a five-year period, 12 in the angina pectoris group and four in the group with congestive failure (Table I); all but one of these were personally examined by us.

TABLE I

MATERIAL

	Number of Operations	Patients Living November, 1939
Angina pectoris	32	12
Congestive failure	25	4
	57	16

Most of the patients who did not survive were closely followed in the hospital dispensary, so that the records show the extent and duration of any improvement that may have taken place after operation. The data concerning the cause of death in the 41 nonsurvivors are based on autopsies in 14 instances, and on observations made in our wards in seven cases where death occurred in this hospital but necropsy was refused. The data on the remaining 20 cases were compiled from letters from attending physicians or death certificates (Table II).

* Read before the American Surgical Association, May 1, 2, 3, 1940, at St. Louis, Mo.

TABLE II

SOURCES OF FOLLOW-UP DATA

		Total No. of Cases
Five-year survivors		16
	Office visit	13
	Home visit	2
	Telephone call	1
Deaths		41
	Autopsy	14
	Died in P.B.B.H.; autopsy refused	7
	Death certificate	11
	Letter from family physician or other hospital	9

During the first year following operation 11 of the 25 patients with congestive failure succumbed, in contrast to seven of the 32 with angina pectoris (Table III). In the succeeding years the mortality in each group did not

TABLE III

PERIOD OF POSTOPERATIVE SURVIVAL

		Living at End of				
	Total Patients	1 Year	2 Years	3 Years	4 Years	5 Years
Angina pectoris	32	25	22	18	15	12
Congestive failure	25	14	11	8	6	4
	57	39	33	26	21	16

exceed four deaths per year. There were five postoperative deaths* in the 57 cases, and all but one, thought to be due to pulmonary embolism, could be directly attributed to heart disease. This mortality rate agrees closely with the operative mortality of 9 per cent reported from the Beth Israel Hospital, Boston, which has had the largest experience with total thyroidectomy for heart disease,[3] but it is somewhat higher than that noted in the collected statistics from other clinics.[13, 21, 24] However, the operative mortality in general is surprisingly low when one considers the poor surgical risks these patients present. As one would expect, nearly all of these patients die eventually from their fundamental cardiac disorder (Table IV). Total

TABLE IV

CAUSES OF DEATH

	Total Deaths	Post-operative	Deaths Attributable to Heart Disease	Other Causes
Angina pectoris	20	3*	16	1 (cerebral hemorrhage)
Congestive failure	21	2‡	17	2 (pneumonia without congestive failure)
	41	5	33	3

* Coronary thrombosis, one day p.o.
Pulmonary edema, one day p.o.
Coronary thrombosis, five days p.o.
‡ Coronary thrombosis, day of operation
Pulmonary embolism, one day p.o.

thyroidectomy should not be regarded as more than a special therapeutic attack upon a group of diseases at present incurable and ultimately fatal.

* In the postoperative death group we include all who died in the hospital within one week of the surgical procedure.

An analysis of the results in each case, on the basis of relief of symptoms, leads to further contrasts between the group with angina pectoris and the group with congestive failure (Tables V, VI, and VII). Despite the small

TABLE V

RELIEF OF PAIN IN ANGINA PECTORIS

A. Patients surviving less than six months		5
B. Patients surviving six months to five years		15
Relief for six months or more	14*	
No relief at six months	1	
C. Patients surviving more than five years		12
Marked and sustained relief (patient's estimate) (substantiated by greater activity and less medication for pain—six)	8	
Temporary relief for six months to two years (degree variable, unimproved at present)	4	
No relief at any time	0	
		32

* In some instances had relief almost to the time of death.

TABLE VI

RELIEF OF CONGESTIVE FAILURE IN CHRONIC RHEUMATIC VALVULAR DISEASE

A. Patients surviving less than six months		5
B. Patients surviving six months to five years		7
Clinical improvement for six months or more (increased activity, fewer symptoms)	5	
No definite improvement	2	
C. Patients surviving more than five years		4
Sustained clinical improvement	1	
Improved for two years	1	
Improved for more than five years, until death from congestive failure	2	
		16

TABLE VII

RELIEF OF CONGESTIVE FAILURE IN ARTERIOSCLEROTIC OR HYPERTENSIVE HEART DISEASE

A. Patients surviving less than six months		5
B. Patients surviving six months to five years		4
Moderate or marked clinical improvement for six months to three and one-half years	3	
No definite improvement	1	
C. Patients surviving for more than five years		0
		9

number of cases certain trends appear clear. In the angina group, with a median age of 61, there are 12 who have survived five years, eight of whom have had sustained clinical improvement. In the congestive failure group, with a median age of 44, only four have survived five years, three of whom have had sustained clinical improvement.* This result is in close accord with the early experiences of other clinics, where the most favorable results have occurred usually in the group with angina pectoris.[13, 21, 24] This may be brought out in another way. Of the 27 patients with angina who lived six months or longer, 26 were at least partially relieved for periods longer than six months. By way of contrast, only 12 of the 15 patients with congestive failure who lived six months or longer were at least partially improved for periods longer than six months.

If the group of patients with congestive failure is subdivided as in Tables VI and VII, one sees an improvement in outlook for those with congestive

* Two of these have died of congestive failure during their sixth postoperative year.

failure from rheumatic valvular disease. However, the slight improvement does not justify much optimism. The median age in this group is 40—20 years less than in the angina group—but the life expectancy in patients with mitral stenosis with marked decompensation is very short. Moreover, it is difficult to evaluate improvement in a group of patients who suffer from recurrent decompensation. Apparent improvement may be merely a natural remission in the disease, and one is less justified in carrying out a radical procedure unless *sustained* improvement is to be expected. We are inclined to be rather pessimistic about the entire congestive failure group. From our small experience with nine cases of congestive failure from arteriosclerotic and hypertensive heart disease, not one of whom survived five years, we feel that total thyroidectomy will give disappointing results if employed here. In the rheumatic group with congestive failure there may be a place for the operation—we have had several cases where we felt there was prolonged and definite benefit—but, unfortunately, there does not appear to be any way to tell in advance which patients will do well. In view of the uncertain benefits and the limited life expectancy, we no longer perform total thyroidectomy for congestive failure.

Our best results from total thyroidectomy have been obtained in the group of patients with intractable angina pectoris. It is admittedly difficult to evaluate improvement in a purely subjective phenomenon like pain, and it is well for us to bear in mind that angina pectoris may undergo remissions and exacerbations like any other chronic disease. It may even cease spontaneously. A well-known tendency under such circumstances is to ascribe the natural improvement to the therapeutic measure employed at the same time. Patients with angina may learn to avoid activities producing pain, and thus bring about fewer attacks. Sometimes the original diagnosis may be in error, as questioned in one of our cases (R. H.). Although our series is numerically small, the relief of pain following total thyroidectomy appears to be beyond question. Every one of our patients, living longer than a few days, had at least temporary improvement. In some cases the relief has been enduring; in others it has lasted only a few months before the reappearance of angina—usually, but not invariably, milder and of a different character. No agreement exists as to the mechanism by which relief is obtained.

The question is raised whether life is prolonged in patients relieved of their pain by total thyroidectomy. Since the prognosis for life varies so widely, a much larger series of cases than is included in the present study will be required to settle the problem. In one recent study of prognosis in angina pectoris the duration of life varied from one month to 23 years after the onset of symptoms.[15] In this same study no signficant change in prognosis could be demonstrated between those who had angina decubitus and those who had it only on effort. In the much more serious group, who have had coronary thrombosis, Dublin[14] cites statistics from several sources showing that patients surviving a first attack may live for years; 28 per

cent in one series survived five years or longer, 20 per cent in another. Our small series is without statistical significance on this point.

It is likewise difficult to select patients who are suitable for total thyroidectomy in the angina pectoris group. Patients making up this series were selected largely on the basis of intractability of pain to ordinary therapeutic measures. Many of them had angina decubitus (ref. Case summaries). No patient in the group of 12 five-year survivors had frank signs and symptoms of congestive failure before operation, while six in the group of 20 who did not survive gave definite evidence of congestive failure. Three of the five-year survivors had some cardiac enlargement before operation—in two it was only slight. Ten of the nonsurvivors had cardiac enlargement—in six this was slight. From this it would appear that either congestive failure or cardiac enlargement is an unfavorable prognostic sign. Interestingly enough, a previous coronary thrombosis does not seem to affect the prognosis adversely.

It is noteworthy that in the five-year follow-up the problem of myxedema in these thyroidectomized cardiacs does not loom large. In no instance in the entire series has myxedema offered a problem comparable to the heart disease for which operation was undertaken. Several patients (S. G., with spontaneous myxedema before operation, and G. S., who was psychotic and uncooperative) have offered considerable difficulty; the remainder, however, almost without exception have proved amenable to management. The case summaries of the survivors and the photographs bear out this point. Nearly all of the surviving patients feel the cold easily, and some of them speak slowly. Although most of them believe they are slowed down mentally, we have difficulty in attributing this possible change to the imposed myxedema but see in it rather the normal slowing down with age. As can be seen in the case summaries, there is considerable variation in the amount of thyroid taken by different patients. We regard these patients, like diabetics, as continuous problems in management, and an effort is made to explain this to them, to see them at regular intervals, to check the basal metabolic rate as needed, and to adjust the dosage of thyroid to the optimum for each individual patient. Should the basal metabolic rate become elevated, there may be a recurrence of angina symptoms. It is very important to bear in mind not only that the optimum dose of thyroid extract may vary with each patient but also that in any individual this requirement may vary from time to time. In our experience a basal metabolic rate of about −15 was satisfactory in the majority of patients, but as the case summaries reveal this level cannot be utilized as the optimum level for all patients. Our experience agrees with others, that surgical myxedema need not interfere too much with the patient's enjoyment of life nor become a serious problem in control.[3, 10, 18]

SUMMARY AND CONCLUSIONS

We are able, at this time, to report a five-year follow-up of 57 consecutive cases of total thyroidectomy performed for heart disease during 1932, 1933,

FIG. 1.

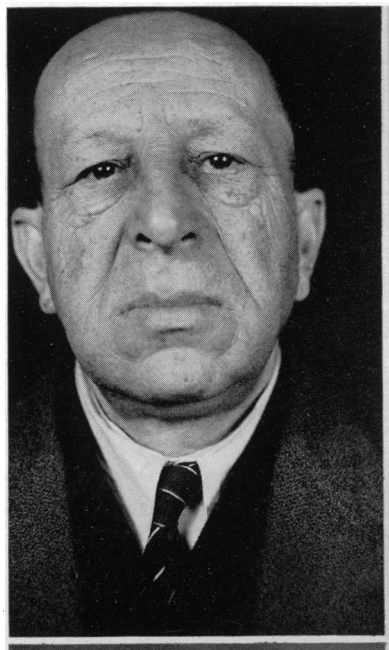


FIG. 2.

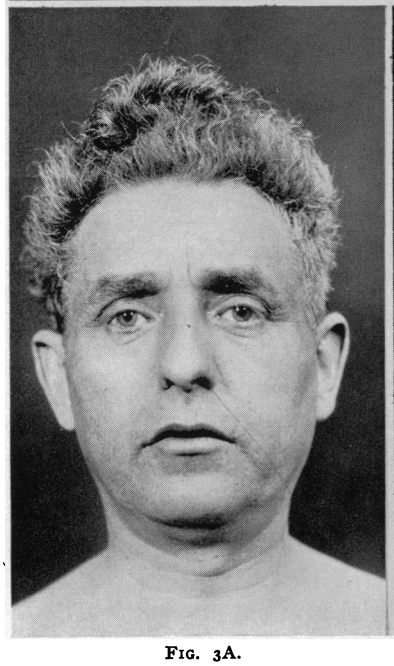


FIG. 3A.

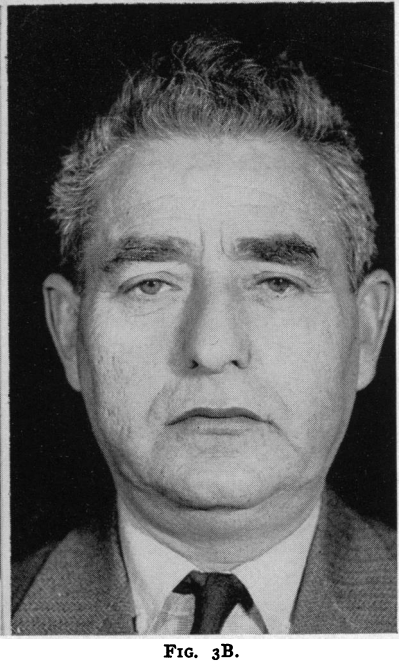


FIG. 3B.

FIG. 1.—M. G., age 61. November, 1939. Six years and two months after operation. B.M.R. +5.

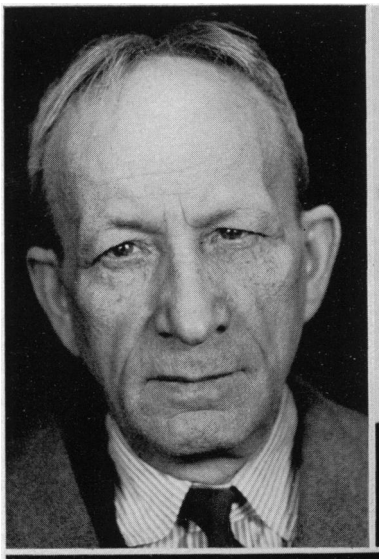
FIG. 2.—W. D., age 60. November, 1939. Five years and 10 months after operation. B.M.R. −11.

FIG. 3A.—B. F., age 50. April, 1934. Before operation. B.M.R. +13.

FIG. 3B.—B. F., age 55. November, 1939. Five years and seven months after operation. B.M.R. −14.

FIG. 4.

FIG. 5A.



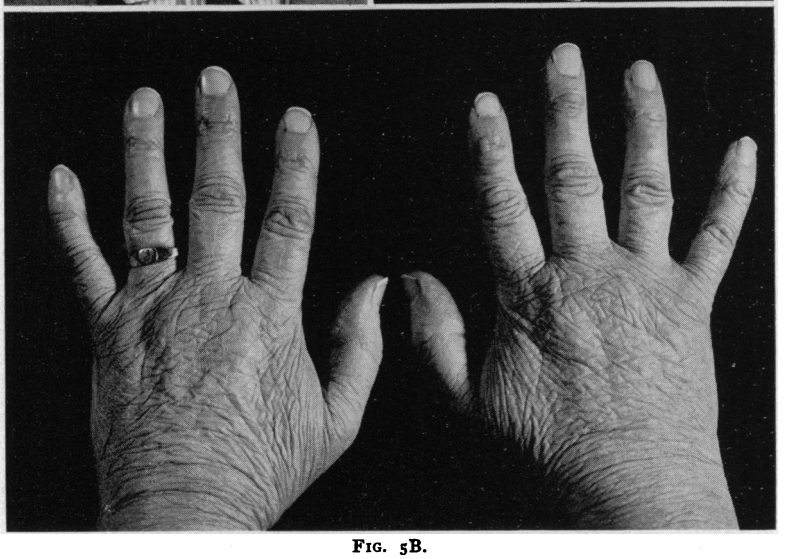


FIG. 5B.

FIG. 4.—H. Z., age 61. December, 1939. Five years and nine months after operation. B.M.R. −15.

FIG. 5A and B.—S. G., age 55. November, 1939. Five years and seven months after operation. B.M.R. −16. Spontaneous myxedema preceded operation.

FIG. 6.

FIG. 7.

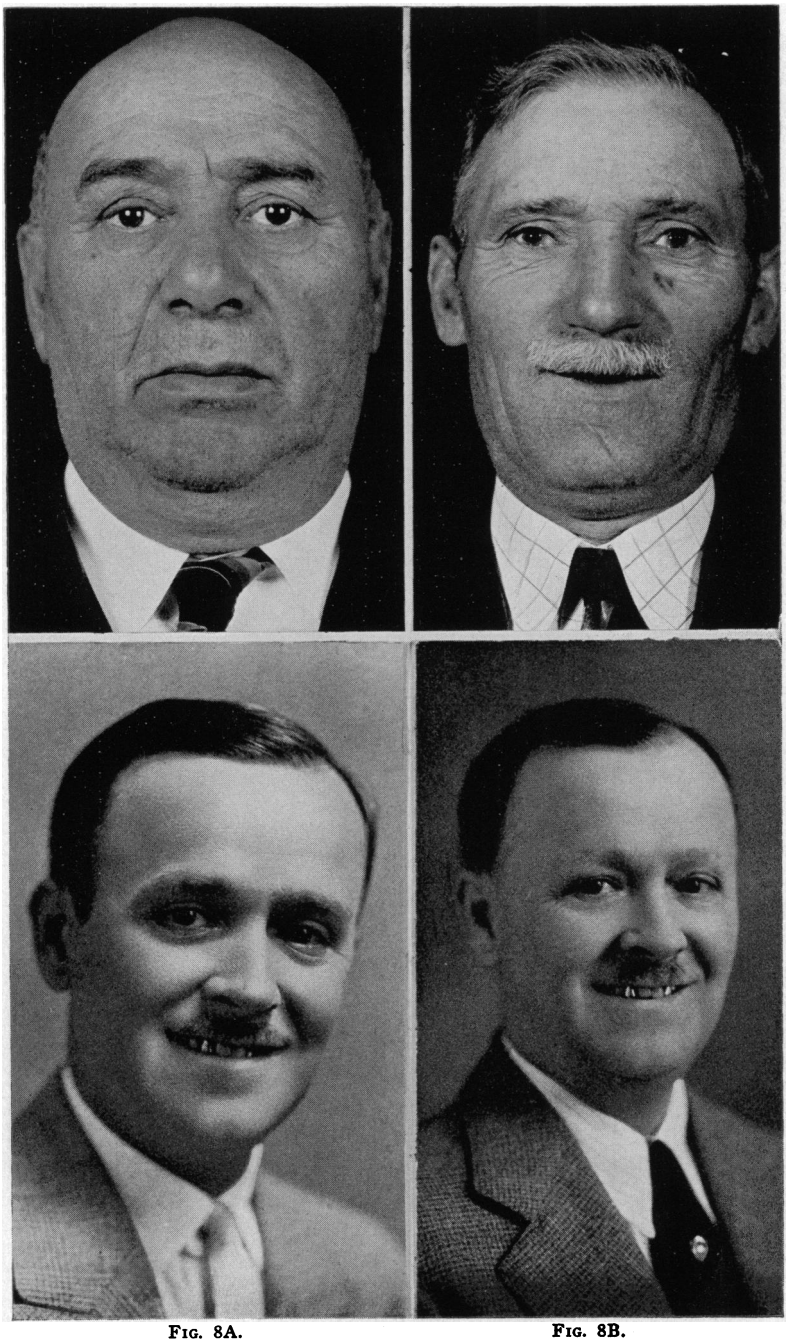


FIG. 8A.

FIG. 8B.

FIG. 6.—Z. K., age 68. November, 1939. Five years and five months after operation. B.M.R. −7.

FIG. 7.—H. B., age 62. December, 1939. Five years and three months after operation. B.M.R. −16.

FIG. 8A.—L. B., age 43. 1927. Seven years before operation.

FIG. 8B.—L. B., age 53. September, 1937. Three years and six months after operation. B.M.R. −15.

FIG. 9.

FIG. 10.

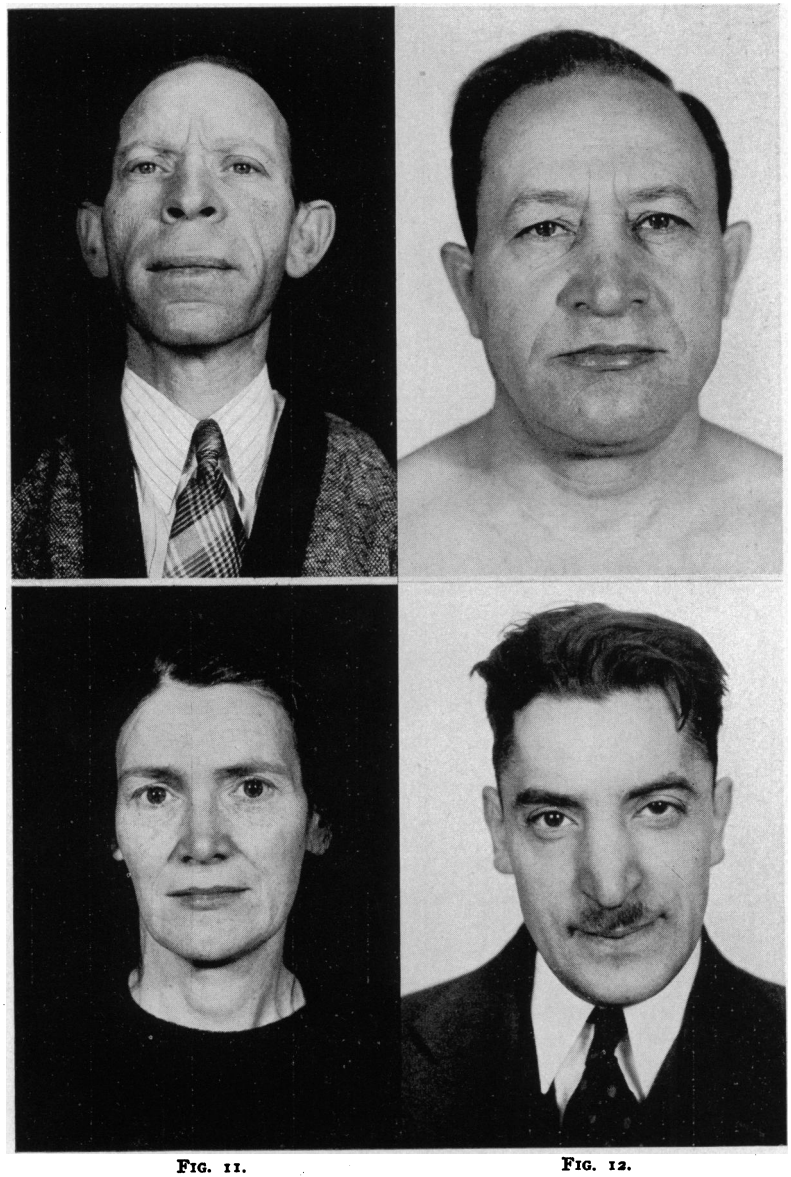


FIG. 11.

FIG. 12.

FIG. 9.—C. C., age 39. December, 1939. Six years and two months after operation. B.M.R. −21.

FIG. 10.—A. P., age 49. November, 1939. Five years and 10 months after operation. B.M.R. −28.

FIG. 11.—M. A., age 40. December, 1939. Five years and eight months after operation. B.M.R. −26.

FIG. 12.—S. B., age 35. December, 1939. Five years and seven months after operation. B.M.R. −20.

TABLE VIII

CASE SUMMARIES

ANGINA PECTORIS—FIVE-YEAR SURVIVORS—12 CASES

Case	Age and Sex	Preoperative: Duration of Symptoms	Preoperative: Coronary Thrombosis	Date of Operation	Date of Follow-Up	Postoperative Survival		Symptoms	Cardiovascular Status*: Cardiac Enlargement	Blood Pressure	Congestive Failure: Symptoms	Congestive Failure: Signs	Vital Capacity	B.M.R.	Medication: Nitroglycerin	Medication: Digitalis	Medication: Thyroid†	Myxedema	Comment
M. P.	60 F.	8 yrs.	No	8-22-33	4-20-40 Home visit	6 yrs., 7 mos.	Pre-op.	Averages 2 attacks daily, on bed and chair existence. Slight effort brings on pain.	No	175/ 70	Mild	Mild	2,200 cc.	+9	Yes	No	No	Feels cold easily. Is normal mentally but feels "slowed down."	Improved by operation for 1-2 yrs., but not now. Daughter says patient is "much better since operation but won't admit it." Has developed evidence of marked hypertension and congestive failure. A partial success.
							5 yrs.+	Bed and chair existence. Still occasional pain. Climbs 2 flights once a day	Yes	260/110	Yes	Yes	?	−15 (1935)	1-2 daily	0.1 Gm. daily	15 mg. every 2 days		
M. G.	55 M.	4 yrs.	No	9-22-33	11-27-39 Office visit	6 yrs., 2 mos.	Pre-op.	Greatly restricted activity. 1-3 attacks daily. A few steps may bring on severe pain.	No	150/ 90	Sl.	No	2,600 cc.	+7	Up to 100 a week	No	No	Mild symptoms. Feels cold easily. May have slight retardation of memory	Definitely improved by operation. Greater activity; less pain; practically no nitroglycerin. Is developing congestive failure. A good result
							5 yrs.+	Slight pain 1-2 times daily, not as severe as before operation. Climbs 2 flights twice daily slowly.	Yes	210/110	Mod.	Mod.	2,800 cc.	+5	One a month	0.1 Gm. daily	15 mg. daily		
R. H.	42 M.	21 yrs.	No	10-17-33	12-12-39 Office visit	6 yrs., 1 mo.	Pre-op.	An active clerk. Up to 20 attacks of numbness and oppression in chest daily; wide radiation. Previous bilateral cervical sympathectomy without relief.	No	160/ 90	No	No	3,500 cc.	−12	20 a day	No	No	Mild myxedema with thickened speech and subjective "poor concentration."	Improved by operation in some respects, not in others. Objectively no change. Obscure case with angina at a very early age and no bad consequences. Diagnosis may be in error. A poor result.
							5 yrs.+	Unchanged. Still at work. Still 20 attacks daily.	No	130/95	No	No	3,000 cc.	−27	20 a day	No	30 mg. daily		
J. S.	61 F.	5 yrs.	? mild attack in 1928	11- 1-33	5-17-40 Office visit	6 yrs., 6 mos.	Pre-op.	Moderately restricted activity. Attacks even at rest.	Sl.	140/ 70	No	No	3,000 cc.	−7	One or more daily	No	No	Mild symptoms. "Brain doesn't work as it should," but she worries less.	"100 per cent improved. Better than 10 years ago." Fairly active woman. Is developing evidence of hypertension and congestive failure. A good result.
							5 yrs.+	Rare attacks, usually in bed. May be free from pain for weeks. Avoids strains. Travels. Climbs 1 flight daily.	Sl.	220/110	Sl.	Mod.	2,400 cc.	−7	One a month	0.1 Gm. daily	30 mg. 5 times weekly		
G. S.	66 M.	10 yrs.	No	11-13-33	4-18-40 Phone	6 yrs., 5 mos.	Pre-op.	Attacks even at rest, requiring up to 30 nitroglycerin pills daily.	No	150/ 90	Sl.	No	2,100 cc.	−4	20-30 daily	No	No	At one time had marked myxedema. Not seen recently. Psychotic and uncooperative.	Had temporary relief for some months. Hard to appraise now, but evidently unsatisfactory. A poor result.
							5 yrs.+	Markedly psychotic. Takes many pills. Complains of severe pain.							20-30 daily	—	45 mg. daily		
W. D.	54 M	8 yrs	No	1-17-34	11-28-39 Office visit	5 yrs., 10 mos.	Pre-op.	2-3 attacks daily, occasionally at rest. Restricted to house.	No	130/ 85	No	No	3,550 cc.	−3	Yes	No	No	Feels cold easily. No mental symptoms.	Very much improved by operation. A good result.
							5 yrs.+	Mild substernal distress every 2-3 days. Less severe than before operation. Drives a car.	No	120/ 80	No	No	3,200 cc.	−11	No	No	15 mg. twice weekly		
H. Z.	56 M.	4 yrs.	1930	3- 5-34	12- 9-39 Office visit	5 yrs., 9 mos.	Pre-op.	Attacks of short duration and only upon effort. Can walk 1 block.	Sl.	145/ 85	Sl.	No	2,600 cc.	−4	Yes	Yes	No	Only slightly diminished speed of cerebration.	Feels improved by operation. Now, 5 years later, not much better than previously, but has had 4 years of sustained relief. Fatigues easily. Is developing congestive failure. A good result.
							5 yrs.+	Some recurrence of pain after 4 years of freedom. Activity restricted.	Yes	108/ 76	Yes	Yes	2,300 cc.	−15	2-8 daily	0.1 Gm. daily	15 mg. daily		
A. K.	72 M	7 mos.	No	3- 6-34	4-20-40 Home visit	6 yrs., 1 mo.	Pre-op.	Severe and prolonged pain even at rest. Not greatly relieved by nitrites.	No	160/ 85	No	No	2,300 cc.	−1	Amyl nitrite	No	No	Moderate myxedema. Slow speech, but alert mentally. Feels cold easily.	A feeble man, age 78, who was regarded as a dubious case for operation. Very emphatic about the good results of operation and permanent relief from terrific pain. Is developing congestive failure. A good result as regards pain.
							5 yrs.+	No pain since operation, although "tiredness" in arms. Bed and chair existence.	No	220/105	Yes	Yes			No	No	No		

B. F.	50 M.	3 mos.	No	4-23-34	11-28-39 Office visit	5 yrs., 7 mos.	Pre-op.	Several attacks daily even at rest. Confined to house.	No	150/ 86	Sl.	Sl.	2,400 cc.	+13	2-3 daily	No	No	Somewhat slowed mentally.	Feels greatly improved by operation. A good result.
							5 yrs.+	Rare pain, in winter only. Climbs 2-3 flights slowly. Drives a car, but not in traffic.	No	140/ 85	Sl.	No	2,800 cc.	−14	9 pills in 5 months	No	15 mg. daily		
S. G.	50 F	3 yrs.	1931	4-27-34	11-29-39 Office visit	5 yrs., 7 mos.	Pre-op.	Spontaneous myxedema, 12 yrs. Mild angina. 1 flight produces pain.	Yes	170/ 75	Mod.	Sl.	1,600 cc.	−25	Yes	Yes	15 mg. daily	Rather marked myxedema with slow speech, *etc.*	Complicated by spontaneous myxedema. Felt improved for several years after operation, but not now. A partial success.
							5 yrs.+	Relief from pain for 1-2 yrs. Attacks now up to 4 times daily. Does light housework.	Yes	195/ 85	Mod.	Mod.	1,600 cc.	−16	Four times a day	Off and on	15 mg. daily		
Z. K.	63 M.	7 mos.	No	6-25-34	11-24-39 Office visit	5 yrs., 5 mos.	Pre-op.	Up to 10 attacks daily even at rest.	No	140/ 90	Sl.	No	—	−10	Yes	No	No	Thinks cerebration slowed.	Improved by operation. A good result.
							5 yrs.+	Very rare pain. Can walk 10 blocks. Feels quite comfortable.	No	120/ 80	Sl.	No	2,500 cc.	−7	No	0.1 Gm. daily	15 mg. daily		
H. B.	57 M.	4 yrs.	1930	8-27-34	12- 5-39 Office visit	5 yrs., 3 mos.	Pre-op.	1-2 attacks daily even at rest. Bed rest most of the day.	No	120/ 75	No	Sl.	2,900 cc.	−5	1-2 daily	No	No	No symptoms.	Very much improved. A good result.
							5 yrs.+	Rare and moderate substernal pain on effort. 1 flight twice a day. Can walk a mile.	? sl.	128/ 90	No	Sl.	3,350 cc.	−16	2-3 a year	No	15 mg. every 2 days		

* No auricular fibrillation in any case. † The figures for thyroid intake were taken from our last follow-up visit and do not represent the continuous requirement of thyroid extract which must be frequently adjusted.

TABLE IX

CASE SUMMARIES
ANGINA PECTORIS—20 DEATHS

					Preoperative Cardiovascular Status*									
Case	Age and Sex	Preoperative Duration of Symptoms	Date of Operation	Symptoms	Preoperative Coronary Thrombosis	Cardiac Enlargement	Blood Pressure	Congestive Failure: Symptoms	Congestive Failure: Signs	Cause of Death	Date of Death	Postoperative Survival	Duration of Postoperative Improvement	Comment
D. G.	43 M.	9 yrs.	12-14-32	Attacks with slightest effort, requiring up to 20 nitroglycerin tablets daily.	No	Yes	165/110	Yes	Yes	Generalized thromboangiitis obliterans. (autopsy)	9- 7-33	8 mos.	7 mos.	Free from pain for 7 months, although congestive failure was not much influenced.
A. R.	61 F.	3 yrs.	2- 4-33	3-4 attacks daily, even at rest. Bed and chair existence.	1931	Sl.	190/100	Yes	Yes	Coronary thrombosis. (autopsy)	9-18-35	2 yrs., 7 mos.	1 yr., 3 mos.	Moderately severe recurrent angina after 15 months of definite relief.
A. H.	59 M.	2 yrs.	7- 8-33	5-6 severe attacks daily, even at rest.	No	Yes	140/ 45	Yes	Yes	Acute pulmonary edema. (letter)	7-26-33	18 days	—	Only case in series with angina from syphilitic aortitis.
A. P.	58 M.	3 yrs.	9-21-33	2-4 attacks daily from slightest effort.	1931 and 1932	No	145/ 80	No	No	Old coronary sclerosis. Congestive failure. (autopsy)	4- 1-38	4 yrs., 6 mos.	3 yrs.	Recurrent angina after 3 years of relief. Coronary thrombosis twice after operation.
I. S.	64 M.	3 yrs.	9-29-33	3-4 severe attacks weekly, even at rest.	1931	No	140/ 85	Yes	Yes	Coronary thrombosis. (autopsy)	7-11-34	9 mos.	7 mos.	Complicated by mild diabetes. Definite improvement for at least 7 months, although still mild distress.
M. K.	60 F.	9 mos.	10-25-33	Frequent attacks, even at rest.	Sept. 1933	Sl.	140/ 80	Mild	Mild	Sudden death in chair. (death certificate)	8-21-37	3 yrs., 9 mos.	1 yr., 3 mos.	After 15 months of great subjective and objective relief recurrent angina and progressive congestive failure developed.
J. M.	52 F.	5 yrs.	10-26-33	Frequent attacks, even on bed rest.	1931 and Aug. 1933	Yes	140/100	Yes	Yes	"Myocarditis" and congestive failure. (death certificate)	4-25-35	1 yr., 6 mos.	1 yr., 4 mos.	Relief from pain for at least 16 months. No effect on congestive failure.
B. A.	61 M.	2 yrs.	10-28-33	Frequent attacks, with slightest effort.	No	Yes	120/ 90	No	No	Pulmonary edema. (coroner)	1-12-38	4 yrs., 2 mos.	2 yrs., 10 mos.	Definite relief for 2 years 10 months. Some recurrent angina after 4 years.
O. H.	68 M.	2 yrs.	10-28-33	Severe attacks, even with the slightest effort.	? Mild attack, 4 months before operation.	No	145/ 90	No	No	Chronic myocarditis. (death certificate)	10- 5-36	2 yrs., 11 mos.	1 yr., 6 mos.	Complicated by mild diabetes. Definite relief for at least 18 months, although recurrent, but atypical, angina 2½ years later.
K. W.	65 F.	12 yrs.	11- 2-33	Up to 15 attacks daily, even at rest.	No	Sl.	190/ 90	No	No	Coronary thrombosis. (death certificate)	2-17-35	1 yr., 3 mos.	6 mos.	Considerable improvement for at least 6 months, although continued nitroglycerin. Recurrent angina after 1 year.

TABLE IX (Continued)

CASE SUMMARIES

ANGINA PECTORIS—20 DEATHS

Case	Age and Sex	Preoperative Duration of Symptoms	Date of Operation	Symptoms	Preoperative Cardiovascular Status*					Cause of Death	Date of Death	Postoperative Survival	Duration of Postoperative Improvement	Comment
					Preoperative Coronary Thrombosis	Cardiac Enlargement	Blood Pressure	Congestive Failure: Symptoms	Congestive Failure: Signs					
W. S.	67 M.	10 mos.	11–22–33	Frequent and severe attacks, even at rest.	No	No	140/ 80	No	No	Coronary thrombosis. (autopsy)	11–27–33	5 days	—	Postoperative death.
I. C.	65 F.	8 mos.	11–24–33	Up to 20 severe attacks daily, even at rest.	? mild attack, 8 months before operation.	No	160/ 80	No	No	Congestive failure. (death certificate)	10–25–37	3 yrs., 10 mos.	3 yrs., 5 mos.	Complete relief from pain for at least 3 years, 5 months.
C. W.	53 M.	5 yrs.	12– 7–33	Attacks requiring up to 10 nitroglycerin tablets daily, even at rest.	1932	No	110/ 70	No	No	Coronary thrombosis. (autopsy)	4– 2–34	3 mos.	1 mo.	Recurrent angina after complete relief for 1 month.
N. N.	61 M.	12 yrs.	12– 8–33	Many attacks daily, even at rest.	? attack in 1927	No	220/110	Yes	No	Cerebral hemorrhage. (death certificate)	8– 9–38	4 yrs., 8 mos.	2 yrs.	Intermittent fibrillation. Symptoms from tetany. Recurrent angina after 2 years of definite improvement.
W. R.	65 M.	1 yr.	12–13–33	1–4 attacks daily, usually at night.	No	No	120/ 80	No	No	Congestive failure. (death certificate)	2–16–36	2 yrs., 8 mos.	1 yr., 2 mos.	Occasional fleeting pains, but definite relief for at least 14 months. Some symptoms from myxedema.
E. L.	67 F.	7 yrs.	12–13–33	4–10 attacks daily, even at rest.	—	Sl.	140/ 70	No	No	Coronary thrombosis. (autopsy)	12–14–33	1 day	—	Postoperative death.
S. S.	62 F.	1 yr.	1– 4–34	4–6 attacks daily, even at rest.	No	Sl.	165/ 95	Sl.	Yes	Pulmonary edema. (hospital—no autopsy)	1– 5–34	1 day	—	Complicated by mild diabetes. Postoperative death.
L. S.	64 F.	3 yrs.	1–20–34	Frequent attacks. Bed rest for 2 yrs.	No	No	220/130	? no	No	Coronary thrombosis. (letter)	2– 5–35	1 yr.	9 mos.	Definite relief from pain, but marked discomfort from myxedema.
L. B.	50 M.	4 yrs.	3–21–34	3 attacks daily.	4 months before operation.	No	110/ 65	Yes	No	Coronary thrombosis. (autopsy)	1– 2–38	3 yrs., 9 mos.	3 yrs., 6 mos.	Marked and sustained relief, practically to time of death.
E. S.	65 F.	3 yrs.	4–12–34	Constant precordial pressure and frequent sharp attacks.	No	Sl.	130/ 80	Yes	No	"Myocarditis." (death certificate)	1–13–37	2 yrs., 9 mos.	3 mos.	Complicated by recurrent hyperthyroidism. Subtotal thyroidectomy in 1931, with relief for 2 years. Following total thyroidectomy no definite relief after 3 months. Definite symptoms by 11 months.

* Only one case had auricular fibrillation (N. N.).

TABLE X

CASE SUMMARIES

CONGESTIVE FAILURE IN CHRONIC RHEUMATIC VALVULAR DISEASE—16 CASES

Case	Age and Sex	Preoperative Duration of Symptoms	Date of Operation	Symptoms	Preoperative Cardiovascular Status†				Cause of Death	Date of Death	Postoperative Survival	Duration of Postoperative Improvement	Comment
					Cardiac Diagnosis*	Auricular Fibrillation	Blood Pressure	Vital Capacity‡					
B. M.	41 F.	23 yrs.	4– 7–33	Recurrent decompensation.	MS & MI. Calcified pericardium	Yes	145–110	1,100 cc.	Congestive failure. (autopsy)	10–17–35	2 yrs., 6 mos.	7 mos.	Definitely, although temporarily, relieved. Frequent postoperative hospitalization for decompensation.
F. R.	53 M.	9 yrs.	5–19–33	Recurrent decompensation.	MS & MI	Yes	210/ 68	1,650 cc.	Congestive failure. (autopsy)	10– 8–33	4 mos.	—	
S. P.	45 M.	2 yrs.	5–26–33	Recurrent ascites (10 paracenteses).	MS & MI. Adherent pericardium	Yes	120/ 70	2,100 cc.	Postoperative death, after pericardiectomy. (hospital—no autopsy)	7–22–33	1 mo.	—	Pericardiectomy in this hospital.
D. W.	28 F.	8 yrs.	6– 5–33	Recurrent decompensation.	MS & MI	No	170/ 85	1,800 cc.	Congestive failure. (letter from physician)	3–21–34	9 mos.	6 mos.	Questionably improved for 6 months, then progressive failure. Markedly psychotic after operation.
C. C.	33 M.	5 mos.	10–16–33	Progressive severe decompensation.	MS & MI	Yes	140/ 90	2,000 cc.	Congestive failure. (hospital—no autopsy) 5-year survival.	6–21–40	6 yrs., 8 mos.	6 yrs.+	Improved subjectively and objectively, although numerous hospital admissions for mild decompensation.
E. F.	54 M.	12 yrs.	12– 6–33	Severe dyspnea without right ventricular failure.	MS & MI	Yes	140/ 80	2,000 cc.	Congestive failure. (hospital—no autopsy)	12– 1–38	4 yrs., 11 mos.	4 yrs.+	Excellent result until terminal illness.
P. R.	39 F.	11 yrs.	1–27–34	Recurrent decompensation.	MS & MI	Yes	125/ 90	2,100 cc.	Congestive failure. (autopsy)	11–29–38	4 yrs., 10 mos.	2 yrs.+	Moderate improvement for at least 2 years.

F. M.	50 M.	10 yrs.	2- 8-34	Recurrent decompensation.	MS	Yes	140/ 80	1,200 cc.	Congestive failure. (autopsy)	4-21-35	1 yr., 2 mos.	2 mos.	Progressive failure after short improvement.
A. P.	44 M.	7 yrs.	2-12-34	Progressive decompensation.	MS	Yes	140/ 80	2,200 cc.	Living Dec., 1939. 5-year survival.	—	5 yrs., 10 mos.	5 yrs.+	Improved subjectively and objectively. Can climb 2 flights. Vital capacity 2,100 cc. B.M.R.—28 on 15 mg. thyroid a day. Moderate myxedema.
S. C.	30 F.	8 yrs.	2-13-34	Recurrent decompensation.	MS, MI, AS & AI	No	110/ 70	1,700 cc.	Congestive failure. (hospital—no autopsy)	2- 7-37	2 yrs., 11 mos.	2 yrs.+	Fairly well for over 2 years. Then gradual failure.
L. A.	24 M.	22 yrs.	4-23-34	Recurrent decompensation.	MS, MI & AI	Yes	140/ 60	1,350 cc.	Congestive failure. (death certificate)	8-26-34	4 mos.	—	Unimproved. A cardiac from the age of 2.
M. A.	35 F.	17 yrs.	4-25-34	Recurrent severe decompensation—6 months. Milder symptoms for a long time.	MS & MI	Yes	150/ 90	2,100 cc.	Living Dec., 1939. 5-year survival.	—	5 yrs., 8 mos.	2 yrs.+	Markedly improved for 2 years. Can walk 1 block. Can climb 1 flight. Vital capacity 1,600 cc. B.M.R. —26 on 15 mg. thyroid a day. No myxedema.
S. B.	30 M.	15 yrs.	5-26-34	Recurrent decompensation.	MS & AI	No	130/ 90	1,800 cc.	Congestive failure and pulmonary embolism. (hospital—no autopsy) 5-year survival.	2-27-40	5 yrs., 9 mos.	5 yrs.+	Definitely improved until terminal illness. Worked intermittently. Climbed 1 flight.
H. B.	46 F.	6 yrs.	6- 2-34	Recurrent decompensation. Bed rest for 4 months.	MS & MI	Yes	204/140	1,200 cc.	Sudden death. ? pulmonary embolism. (hospital—no autopsy)	6- 3-34	1 day	—	Postoperative death.
M. B.	50 M.	6 mos.	8- 1-34	Progressive decompensation.	MS	Yes	186/134	1,100 cc.	Slow coronary closure. (letter from physician)	4-23-37	2 yrs., 8 mos.	2 yrs.+	Some improvement for 2 years.
E. P.	31 F.	13 yrs.	12-12-34	Recurrent decompensation.	MS, MI, AS & AI	No	150/ 60	2,400 cc.	Cerebral emboli. (hospital—no autopsy)	2- 8-35	1 mo.	—	Decompensation improved after operation.

* MS—mitral stenosis. MI—mitral insufficiency. AS—aortic stenosis. AI—aortic insufficiency.

† Cardiac enlargement and evidence of congestive failure in all 16 cases.

‡ The vital capacity reading is the one just before operation, and may have been lower earlier.

TABLE XI

CASE SUMMARIES

CONGESTIVE FAILURE IN ARTERIOSCLEROTIC OR HYPERTENSIVE HEART DISEASE—9 CASES

					Preoperative Cardiovascular Status*								
Case	Age and Sex	Preoperative Duration of Symptoms	Date of Operation	Symptoms	Cardiac Diagnosis	Auricular Fibrillation	Blood Pressure	Vital Capacity†	Cause of Death	Date of Death	Postoperative Survival	Duration of Postoperative Improvement	Comment
R. M.	61 M.	4 yrs.	3- 9-33	Severe decompensation.	Chronic myocarditis	Yes	136/ 90	1,950 cc.	Chronic myocarditis heart block. (hospital—no autopsy)	8-27-33	5 mos.	3 mos.	
G. C.	70 M.	13 yrs.	4-11-33	Coronary thrombosis, with progressive decompensation—2½ weeks.	Chronic myocarditis. Coronary sclerosis	No	156/ 88	1,200 cc.	Coronary thrombosis and congestive failure. (autopsy)	4-11-33	..	—	Postoperative death. A desperate case.
L. W.	48 M.	4 yrs.	8- 3-33	Recurrent decompensation. Some chest pain.	Chronic myocarditis	Yes	190/ 96	2,250 cc.	Lobar pneumonia. No cardiac failure. (autopsy)	June, 1937	3 yrs., 10 mos.	3 yrs.+	Improved until death from another cause. Best result in this group.
H. E.	40 M.	5 yrs.	1-13-34	Severe decompensation. Bed rest for 4 months.	Chronic myocarditis	No	120/ 80	1,700 cc.	Pulmonary edema. (hospital letter)	2-16-34	1 mo.	—	
P. S.	50 F.	4 yrs.	2- 1-34	Recurrent decompensation.	Chronic myocarditis	No	174/110	1,750 cc.	"Chronic interstitial nephritis." Chronic myocarditis. (death certificate)	5-23-35	1 yr., 3 mos.	2 mos.	Slight improvement. Only follow-up contact 2 months after operation.
O. McG.	50 M.	5 yrs.	6-25-34	Severe dyspnea. Bed rest for 6 weeks.	Hypertensive cardiovascular disease	No	170/120	1,600 cc.	"Arteriosclerosis. Chronic nephritis and uremia." (death certificate)	1-21-36	1 yr., 7 mos.	6 mos.	Temporary relief in a previously bed-ridden man.
H. W.	56 M.	3 yrs.	7-19-34	Progressive decompensation.	Chronic myocarditis. Coronary disease	No	125/ 70	2,000 cc.	Congestive failure. (letter from physician)	10-15-34	2 mos.	—	Unimproved. Not much cardiac enlargement.
M. K.	37 M.	6 mos.	8- 9-34	Progressive decompensation.	Hypertensive vascular disease. Nephrosclerosis	No	240/150	—	Bronchial pneumonia. No cardiac failure. (letter from physician)	9-23-34	1 mo.	—	
S. L.	36 M.	6 mos.	8-15-34	Dyspnea and constant precordial tightness.	Hypertensive cardiovascular disease	No	210/ 80	1,200 cc.	Congestive failure. (letter from wife)	2-28-39	4 yrs., 6 mos.	2 yrs., 6 mos.	Definite improvement for 2½ years, although somewhat troubled by myxedema. Last follow-up April, 1937.

* Cardiac enlargement (slight only in H. W.) and evidence of congestive failure in all cases.

† The vital capacity reading is the one just before operation, and may have been lower earlier.

and 1934. The majority of the patients had been unrelieved by medical therapy and presented a serious operative risk. There were 12 survivors in the group of 32 with angina pectoris, and four survivors in the group of 25 who had congestive failure. There were five postoperative deaths; four of these, as well as all but three of the later deaths, were attributable to heart disease.

The best results were obtained in patients with angina pectoris. Twenty-six of the 27 patients surviving more than six months were relieved of pain in some degree for six months or longer, and eight of the 12 five-year survivors had sustained relief. In this group it was noted that preoperative evidence of congestive failure or cardiac enlargement was an unfavorable prognostic sign for long survival.

In the patients with congestive failure the five-year results were disappointing. Fifteen of the 25 patients lived for six months or more, and 12 of these had relief for six months or longer. There were four five-year survivors, three showing sustained relief; two of these three have died of congestive failure in the sixth year after operation. Results were better in the group having congestive failure from chronic rheumatic valvular disease than from arteriosclerotic or hypertensive heart disease.

We conclude that in a selected group of patients with intractable angina pectoris, total thyroidectomy is a worth while therapeutic measure, and is without unwarranted risk.

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